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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/517,320	07/21/2005	Per Mansson	Mans3011/REF	3650
23364	7590	08/08/2007	EXAMINER	
BACON & THOMAS, PLLC 625 SLATERS LANE FOURTH FLOOR ALEXANDRIA, VA 22314			JUNG, UNSU	
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Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

<b>Office Action Summary</b>	<b>Application No.</b>	<b>Applicant(s)</b>	
	10/517,320	MANSSON ET AL.	
	<b>Examiner</b>	<b>Art Unit</b>	
	Unsu Jung	1641	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

#### Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

#### Status

- 1) ☒ Responsive to communication(s) filed on 24 May 2007.
- 2a) ☐ This action is **FINAL**.                      2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

#### Disposition of Claims

- 4) ☒ Claim(s) 1-12 is/are pending in the application.
- 4a) Of the above claim(s) 8-12 is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-7 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

#### Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 30 October 2006 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

#### Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All    b) ☐ Some \*    c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
  2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  3. ☒ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

#### Attachment(s)

- |  |   |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892)  | 4) <input type="checkbox"/> Interview Summary (PTO-413)<br>Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)   | 5) <input type="checkbox"/> Notice of Informal Patent Application                       |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08)<br>Paper No(s)/Mail Date <u>5/24/2007</u> . | 6) <input type="checkbox"/> Other: _____  |

## **DETAILED ACTION**

### ***Continued Examination Under 37 CFR 1.114***

1. A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after final rejection. Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous Office action has been withdrawn pursuant to 37 CFR 1.114. Applicant's submission filed on May 24, 2007 has been entered. Applicant's submission included amendments to claim 1.
2. Claims 1-12 are pending, claims 8-12 have been withdrawn from consideration, and claims 1-7 are under consideration for their merits.

### ***Information Disclosure Statement***

3. The information disclosure statement (IDS) submitted on May 24, 2007 has been considered by the examiner. However, the first author name for Liedberg et al. reference has been changed to "Svedhem et al." as indicated on the attached IDS.

### ***Rejections Withdrawn***

4. Applicant's arguments, see p5, filed May 24, 2007, with respect to the rejection under 35 U.S.C. 112, second paragraph have been fully considered and are persuasive.

The rejection of claims 1-7 under 35 U.S.C. 112, second paragraph has been withdrawn.

***Claim Rejections - 35 USC § 112***

5. The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

6. Upon further consideration of the term "derivatized explosives and narcotics," claims 1-7 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

In claim 1 and all dependent claims thereof, the term "derivatized explosives and narcotics" is vague and indefinite. The specification fails to define what is meant by "derivatized" and it is unclear what the term "derivatized explosives and narcotics" means. For the purpose of examination, the term "derivatized" has been interpreted based on dictionary definition of derivative, which is defined as "a chemical substance related structurally to another substance and theoretically derivable from it" or "a substance that can be made from another substance in one or more steps" (Webster's New Collegiate Dictionary, G & C Merriam Co., Springfield, MA, 1974, p306).

Therefore, the claims are indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention so that one of ordinary skill in the art would not be reasonably apprised of the metes and bounds of the invention as it reads on "derivatization", "derivatized explosives", and/or derivatized narcotics".

7. The following is a quotation of the first paragraph of 35 U.S.C. 112:

The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

8. Upon further consideration of the term "derivatized explosives and narcotics," claims 1-7 are rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the written description requirement. The claim(s) contains subject matter which was not described in the specification in such a way as to reasonably convey to one skilled in the relevant art that the inventor(s), at the time the application was filed, had possession of the claimed invention.

The following written description rejection is set forth herein.

Claims 1-7 recite "derivatized explosives and narcotics" as part of the invention.

There is insufficient written description in the specification as-filed of "derivatized explosives and narcotics" as recited in the instant claims.

The written description requirement for a claimed genus may be satisfied through sufficient description of a representative number of species by actual reduction to practice, reduction to drawings, or by disclosure of relevant, identifying characteristics, i.e., structure or other physical and/or chemical properties, by functional characteristics coupled with a known or disclosed correlation between function and structure, or by a combination of such identifying characteristics, sufficient to show the applicant was in possession of the claimed genus. (See Federal Register, Vol. 66, No. 4, pages 1099-1111, Friday January 5, 2001, especially page 1106 3rd column). A "representative

number of species" means that the species which are adequately described are representative of the entire genus. Thus, when there is substantial variation within the genus, one must describe a sufficient variety of species to reflect the variation within the genus. MPEP 2163 II.A.3a.ii.

The claims recite a genus "derivatized explosives and narcotics" as part of the invention without providing a physical structure or testable functional activity for the "derivatized explosives and narcotics." The dictionary definition of derivative is defined as "a chemical substance related structurally to another substance and theoretically derivable from it" or "a substance that can be made from another substance in one or more steps" (Webster's New Collegiate Dictionary, G & C Merriam Co., Springfield, MA, 1974, p306) as set forth in item 5 above.

The genus of the "derivatized explosives and narcotics" are therefore very large since a substance (explosives/narcotics) can be modified in variety of ways to form a derivatized form (derivative) of the substance for various applications. Applicant has disclosed only three trinitrotoluene (TNT) derivatives (Fig. 5 and p10, lines 12-22). Thus, Applicant has disclosed only a limited species of derivatized explosives and/or narcotics," namely derivatives of TNT. The structural or other physical and/or chemical properties of TNT are distinct from other explosives and narcotics as disclosed in the specification (Fig. 1 and p5, lines 30 and 31). Consequently, derivatized forms of different explosives and/or narcotics lack common structure and physical and/or chemical properties. Hence, the claimed "derivatized explosives and narcotics" lack a common structure essential for their function and the claims do not require any

particular structure basis or testable functions be shared by the instant "derivatized explosives and narcotics."

It does not appear based upon the limited disclosure of TNT derivatives alone that Applicant was in possession of the necessary common attributes or features of the elements possessed by the members of the genus in view of the limited number of species disclosed and extensive variation permitted within the genus of "derivatized explosives and narcotics."

"Adequate written description requires a precise definition, such as by structure, formula, chemical name or physical properties, not a mere wish or plan for obtaining the claimed chemical invention." *Regents of the University of California v. Eli Lilly and Co.* 43 USPQ2d, 1398, (Fed. Cir. 1997).

The disclosure must allow one skilled in the art to visualize or recognize the identity of the subject matter of the claim. *Id.* 43 USPQ2d at 1406.

In the absence of disclosure of relevant, identifying characteristics of the "derivatized explosives and narcotics," there is insufficient written disclosure under 35 U.S.C. 112, first paragraph.

Applicant is directed to the Guidelines for the Examination of Patent Applications Under the 35 U.S.C. 112, 1 "Written Description" Requirement, Federal Register, Vol. 66, No. 4, pages 1099-1111, Friday January 5, 2001.

***Claim Rejections - 35 USC § 103***

9. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

10. The factual inquiries set forth in *Graham v. John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

11. This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).



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12. Claims 1, 2, 6, and 7 are rejected under 35 U.S.C. 103(a) as being unpatentable over Willner et al. (WO 00/43774, July 27, 2000) in view of Svedhem et al. (*J. Org. Chem.* 2001, Vol. 66, pp4494-4503) and Bentley et al. (U.S. PG Pub. No. US 2001/0027212 A1, Oct. 4, 2001).

Willner et al. teaches a sensitive method of detecting small amount of low molecular weight compounds (typically below about 1,500 Daltons), which includes explosive molecules such as dinitrotoluene (DNT) and TNT (derivatized explosives, see entire document, particularly Fig's 1A and 1B) and drugs such as heroin and cocaine (narcotics, p5, lines 1-15) using quartz crystal microbalance (QCM). Willner et al. further teaches that any method intended for sensing the presence of explosive molecules or other types of low molecular weight molecules such as drugs should be highly sensitive and adapted for detecting a small amount of molecules. The QCM includes a piezoelectric crystal sandwiched between two gold electrodes (Abstract and p23, lines 14-17) coated with an antigen, which is then contacted with an antibody (p24, lines 8-12). Measurement of resonance frequency at this stage yields a certain basic frequency (p24, lines 9-12). Challenging the electrode with a sample comprising antigens causes release of some of the antibodies to yield a soluble antigen-antibody complex (antigens reversibly bound to antibodies specific for the antigens), which reduces the immobilized mass and consequently the frequency is increased as a result of and signifies the presence of the assayed molecule in the medium (p24, lines 13-19).

With respect to claim 2, Willner et al. teaches a coated gold surface (gold electrode) on a solid support (Abstract and p23, lines 14-17).

With respect to claim 6, Willner et al. teaches a coated metal surface on a solid support, wherein the solid support is piezoelectric crystal sandwiched between two gold electrodes (Abstract and p23, lines 14-17).

However, Willner et al. fails to teach a coated metal surface further comprising a self-assembled monolayer (SAM) of oligo(ethylene glycol)-terminated (OEG-terminated) alkanethiol amides.

Svedhem et al. teaches a self-assembled monolayer (SAM) of oligo(ethylene glycol)-terminated (OEG-terminated) alkanethiol amides on gold coated surface on a solid support (see entire document, particularly p4503, right column, *Preparation of SAMs*) designed to address structure and stability of biosensing interfaces (Abstract). SAM-forming OEG molecules includes alkyl portion of the alkanethiols having 2, 5, 11, and 15 CH<sub>2</sub> groups (methylene groups) and OEG portion has 1, 2, 4, 6, 8, 10, and 12 (CH<sub>2</sub>CH<sub>2</sub>O) (ethylene oxy) units (Abstract). Organic modifications of gold surfaces by SAMs have proven to be successful in biosensor applications (p4494, *Introduction*, second paragraph). Furthermore, ethylene glycols provide good anchors for biological receptors and ligands and reduce nonspecific binding of proteins and other bioactive molecules (p4494, *Introduction*, first paragraph). Poly(ethylene glycol) derivatives are also ideal as spacer candidates because they are inexpensive, water soluble, stable, and available in a wide range of molecular weight distributions (p4494, *Introduction*, first paragraph). Svedhem et al. further teaches that the PEG derivatives (OEG-terminated alkanethiol amides) can be used as spacer molecules (p4494, *Introduction*, first paragraph) as closely packed ligands attached to the OEG-terminated alkanethiol

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amides would become less accessible to binding due to sterical hindrance (p4494, *Introduction*, second paragraph).

With respect to claim 7, Svedhem et al. teaches OEG having 4-6 ethylene oxy units and the alkyl group having 15 methylene units (Abstract).

However, Svedhem et al. fails to teach low molecular weight antigens bound via an amide group to the SAM-forming OEG molecules.

Bentley et al. teaches that conventional amide linkages formed between amine groups on drugs, which include peptides, proteins and small agents (antigens), having amine groups and PEG through non-hydrolyzable amide linkages, which are generally stable (see entire document, particularly p1, paragraph [0007]).

Therefore, it would have been obvious to one of ordinary skill in the art at the time of the invention to employ mixed SAM of OEG-terminated alkanethiol amides with and without attached ligands as taught by Svedhem et al. in the QCM biosensor of Willner et al. in order to provide a biosensing interface with structurally stable SAM, which reduce nonspecific binding of proteins and other bioactive molecules. The advantage of having a structurally stable SAM, which has the characteristic of reducing nonspecific binding of proteins and other bioactive molecules and reduces sterical hindrance provides the motivation to include the SAM of OEG-terminated alkanethiol amides of Svedhem et al. in the QCM biosensor of Willner et al. with a reasonable expectation of success since the solid support of Willner et al. includes a gold coated surface and Svedhem et al. teaches that the SAM of OEG-terminated alkanethiol amides can be formed on gold coated surfaces for use as a biosensing interfaces.

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Furthermore, it would have been obvious to one of ordinary skill in the art at the time of the invention to use conventional amide linkages formed between amine groups on drugs and ethylene glycol of OEG as taught by Bentley et al. in order to immobilize antigens of interest on the SAM of OEG-terminated alkanethiol amides of Svedhem et al. as the amide linkages are generally stable and non-hydrolyzable. The advantage of amide linkages, which are stable and non-hydrolyzable provides the motivation to employ amide linkages to immobilize antigens of Willner et al. on the SAM of OEG-terminated alkanethiol amides of Svedhem et al. with a reasonable expectation of success as Bentley et al. teaches that small molecules such as drugs can be immobilized to ethylene glycols of PEG, which are also present in OEGs.

13. Claims 3-5 are rejected under 35 U.S.C. 103(a) as being unpatentable over Willner et al. (WO 00/43774, July 27, 2000) in view of Svedhem et al. (*J. Org. Chem.* 2001, Vol. 66, pp4494-4503) and Bentley et al. (U.S. PG Pub. No. US 2001/0027212 A1, Oct. 4, 2001) as applied to claim 1 above, and further in view of Duffy (U.S. PG Pub. No. US 2002/0028463 A1, Mar. 7, 2002).

Willner et al. in view of Svedhem et al. and Bentley et al. teaches a coated metal surface on a solid support as set forth in item 12 above. Willner et al. further teaches that antigens are selected from a group consisting of explosives and narcotics (p5, lines 1-15).

With respect to claim 4, Willner et al. teaches derivatized explosives, which include TNT and DNT (Fig's 1A and 1B). The derivatized DNT includes an amine group, which can form an amide linkage with ethylene glycol of OEG.

With respect to claim 5, Willner et al. teaches antigens are selected from cocaine and heroine (p5, lines 13-15).

However, Willner et al. in view of Svedhem et al. and Bentley et al. fails to teach a coated metal surface on a solid support, wherein the antigens are bound to the same or different monolayers in patches on the solid support.

Duffy teaches an array system which can be used to elucidate interactions between molecules (see entire document, particularly p5, paragraph [0039]). The system comprises array of binding areas (patches) for immobilizing biomolecules and provides for high throughput, as many interactions may be tested in a single assay (p5, paragraphs [0040] and [0041]). Duffy further teaches that the interactions between molecules can be detected using QCM (p13, paragraph [0113]).

Therefore, it would have been obvious to one of ordinary skill in the art at the time of the invention to include an array of binding patches for immobilization of antigens of the Willner et al. in view of Svedhem et al. and Bentley et al. as taught by Duffy in order to perform high throughput analysis of many interactions, which may be tested in a single assay. The advantage of having the capacity to perform high throughput analysis of many interactions, which may be tested in a single assay, provides the motivation to include an array of binding patches for immobilization of antigens of the Willner et al. in view of Svedhem et al. and Bentley et al.. Further, one

of ordinary skill in the art would have had a reasonable expectation of success since Duffy teaches that the array system can be used with QCM detection methods to detect binding interaction on the array surface.

### ***Response to Arguments***

14. Rejection of claims 1, 2, 6, and 7 under 35 U.S.C. 103(a) as being unpatentable over Willner et al. in view of Svedhem et al. and Bentley et al.

Applicant's arguments filed on October 30, 2006 have been fully considered, but they are not persuasive in view of previously stated grounds of rejection.

Applicant's argument that Svedhem et al. does not disclose or suggest producing a SAM from two types of molecules (pp6-8) is not found persuasive in view of previously stated grounds of rejection. As stated in item 13 of Office Action dated January 24, 2007, Svedhem et al. teaches that the SAM comprises OEG-terminated alkanethiol amides on gold coated surfaces (see entire document, particularly p4503, right column, *Preparation of SAMs*). Further, Svedhem et al. teaches the PEG derivatives (OEG-terminated alkanethiol amides) can be used as spacer molecules (p4494, *Introduction*, first paragraph) as closely packed ligands attached to the OEG-terminated alkanethiol amides would become less accessible to binding due to sterical hindrance (p4494, *Introduction*, second paragraph). Therefore, one of ordinary skill in the art would recognize that OEG-terminated alkanethiol amides, which do not contain biological receptors/ligands would be mixed with OEG-terminated alkanethiol amides attached to biological receptors/ligands to form SAM on gold coated surfaces in order to provide

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space between biological receptors/ligands, which would reduce sterical hindrance and facilitate binding of receptors and ligands.

Applicant's argument regarding coupling of biomolecules using carboxylic acid group terminated analogue (Lahiri et al. reference, p7) is not found persuasive in view of previously stated grounds of rejection. The previous Office Action dated January 24, 2007 established that Svedhem et al. is silent on teaching that low molecular weight antigens are bound via an amide group to the SAM-forming OEG molecules. However, since the method of attaching small antigens via amide linkages, which has the advantage of being stable, is well known in the art as disclosed in Bentley et al., it would have been obvious to one of ordinary skill in the art at the time of the invention to use conventional amide linkages formed between amine groups on drugs and ethylene glycol of OEG as taught by Bentley et al. in order to immobilize antigens of interest on the SAM of OEG-terminated alkanethiol amides of Svedhem et al., as the amide linkages are generally stable and non-hydrolyzable. Therefore, Applicant's argument regarding carboxylic acid group terminated analogue is irrelevant as Willner et al. in view of Svedhem et al. and Bentley et al. teaches coupling of biomolecules via amide linkages, not carboxylic acid linkages.

In response to Applicant's argument that the references fail to show certain features of Applicant's invention, it is noted that the features upon which Applicant relies (i.e., coating comprising "inert molecule" and "biologically active molecule") are not recited in the rejected claim(s). Although the claims are interpreted in light of the

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specification, limitations from the specification are not read into the claims. See *In re Van Geuns*, 988 F.2d 1181, 26 USPQ2d 1057 (Fed. Cir. 1993).

Taken together, Willner et al. in view of Svedhem et al. and Bentley et al. teaches all the limitations of the claimed invention having mixture of SAM (OEG-terminated amide group-containing alkyl thiols) with or without bioactive molecules (drugs/explosives) on a solid metal support.

15. Rejection of claims 3-5 under 35 U.S.C. 103(a) as being unpatentable over Willner et al. in view of Svedhem et al. and Bentley et al., and further in view of Duffy

Applicant's arguments filed on October 30, 2006 have been fully considered but they are not persuasive in view of previously stated grounds of rejection and reasons set forth in item 14 above.

16. Since the prior art fulfills all the limitations currently recited in the claims, the invention as currently recited would read upon the prior art.

**Conclusion**

17. No claim is allowed.

18. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Unsu Jung whose telephone number is 571-272-8506. The examiner can normally be reached on M-F: 9-5.



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If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Long Le can be reached on 571-272-0823. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.



Unsu Jung, Ph.D.  
Patent Examiner  
Art Unit 1641